# Operating Manual

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**Installation, Operating and Maintenance Instructions**

# Model 110-9S

# Two Stage Preset Valve With Air Check

Ron 2-4-19

## GENERAL DESCRIPTION

The OCV Model 110-9S is specifically designed for fuel loading systems and is used in conjunction with a two-stage preset meter (Mechanical or Electronic).It performs the following functions:

**SINGLE-STAGE STARTUP WITH AIR CHECK**: When signaled by the preset, the 110-9S will open as long as no air is sensed in the air eliminator.
**TWO-STAGE SHUTDOWN**: Working off electrical signals from the preset, the 110-9S will close to the low flow position near the end of the load for "topping off" flow. At the end of the load, the valve will go fully closed.

## PRESET CONTROLLERS

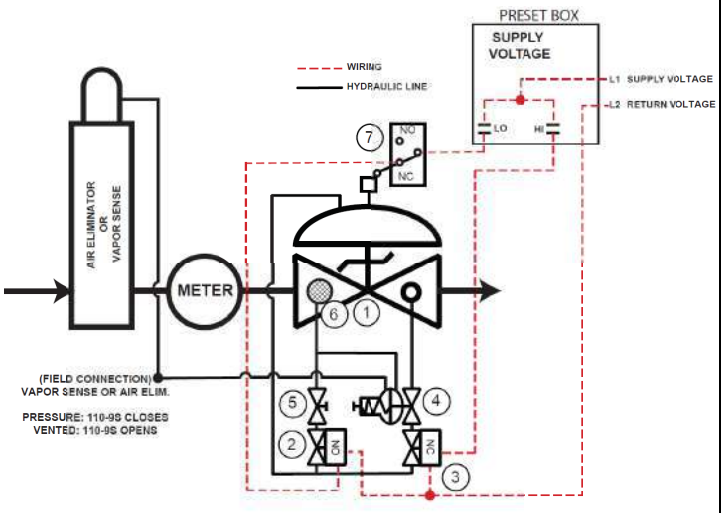
**Mechanical Preset Controllers,** like the Veeder Root 7600 and the LC M500, incorporate two SPDT switches which are mechanically toggled inside the preset after a certain percent of the load is complete. Historically, OCV has utilized the previous version of this valve, the Model 110-9, to operate with these presets.
With the advent and growing popularity of **Electronic Preset Controllers,** like LCR2, EMR4, & Multiload, a different approach is needed. These presets have a much simpler switching arrangement, typically two outputs that operate only on-off. Depending on operating conditions, the 110-9 may not work properly with these presets.

The 110-9Shas been designed to operate reliably with both electronic presets as well as the older mechanical types.

## SCHEMATIC

The 110-9S consists of the following components, arranged as shown on the schematic diagram:

1. **Model 65 Basic Valve Assembly**, a hydraulically operated, diaphragm actuated, pilot controlled, globe valve which closes with an elastomer-on-metal seal.
2. **Model 450 Two Way, Normally Open Solenoid Pilot**. This pilot is energized to its closed position by the control circuit to enable the valve to hold its low flow position during the first stage of shutdown.
3. **Model 451 Two Way, Normally Closed Solenoid Pilot**. This pilot is the primary electrical control device on the valve. It is energized to its open position to enable the main valve to open, and deenergized to its closed position to make the main valve close.
4. **Model 1356 Differential Control Pilot** that senses inlet pressure and air eliminator pressure at the orificed bleed. Closes when there is an accumulation of air in the air eliminator.
5. **Model 141-2 Needle Valve** that is anadjustable restriction devicefor the air check valve operation. It also serves as the opening and closing speed for the main valve.
6. **Model 123 Inline Strainer** that protects the pilot system from solid contaminants in the line fluid.
7. **Model 150 Limit Switch Assembly**, a SPDT switch unit actuated by movement of the valve stem. It routes the electrical signals required for the two-stage closing function.

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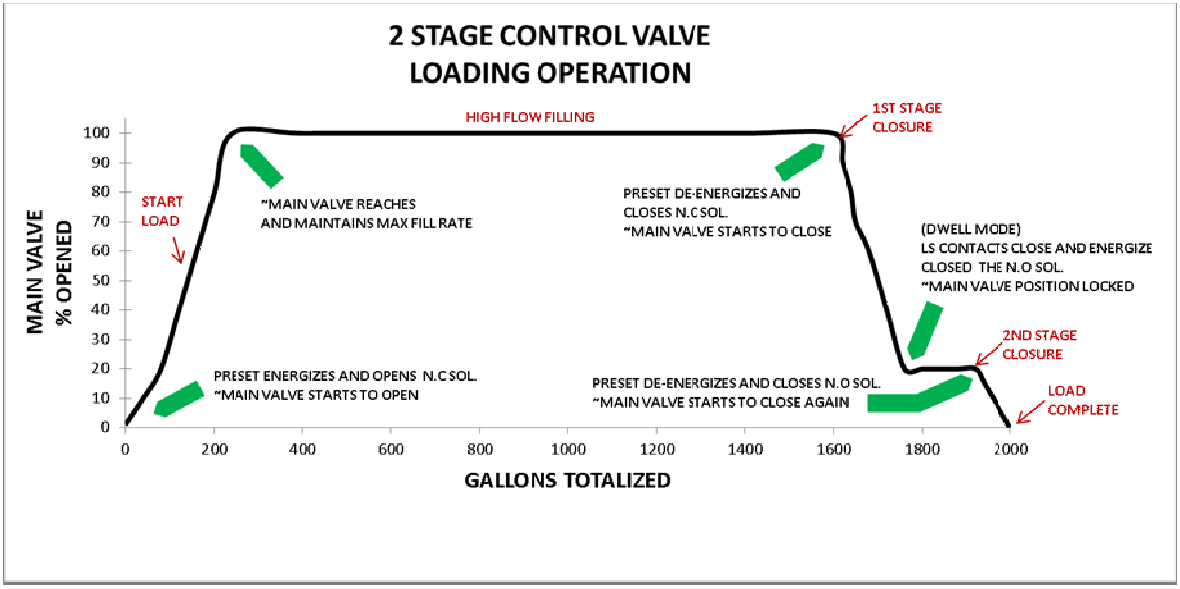



## THEORY OF OPERATION

The 110-9S fill rate is controlled via OCV supplied solenoids & limit switch, as well as a customer supplied preset controller. The filling operations will be described in detail using given schematic, graph, and below table. Note that the actual preset controller output labels may vary. The schematic in this manual uses HI (high flow) and LO (low flow) for simplification.

| | STATUS | HI FLOW FILLING | | DWELL FLOW FILLING | | END LOAD |
|---|---|---|---|---|---|---|
| SYSTEM | % GALLONS TOTALIZED | 1% | 90% | 91% | 91-99% | 100% GPM |
| PRESET OUTPUTS | HI, SW1, S1 MECH / EL. | ON (CLOSED) | | OFF(OPENED) | | |
| | LO, SW2, S2 ELECT. PRESET | ON (CLOSED) | | | | OFF (OPENED) |
| | LO, SW2, S2 MECH. PRESETS | OFF (OPENED) | | ON (CLOSED) | | OFF (OPENED) |
| CONTROL VALVE | N.C SOLENOID | ENERG. | | DE-ENERG | | |
| | N.O SOLENOID | DE-ENERG. | | | ENERG. | DE-ENERG |
| | LIMIT SWITCH | CLOSED | OPENED | OPENED | CLOSED | CLOSED |
| | 65 MAIN VALVE | OPENING | OPENED | CLOSING | LOCKED | CLOSED |

OPENING: A loading run is initiated via preset controller electronic outputs. The **HI** output directly energizes the normally closed solenoid (3), opening it, Also upon startup, the **LO** output, wired to the normally open solenoid through the limit switch, may or may not supply power to the normally open solenoid. Neither operation mode of the N.O Solenoid will affect opening of the main valve.

NOTE: If the valve opening is not adequate (i.e., the flow rate is too low), needle valve (4) adjusting knob should be carefully turned clockwise as described in "Startup and Adjustments" section.

AIR CHECK FUNCTION: To understand how the 110-9S air check function works, it is best to start with the 141-2 needle valve (5) and 1356differential pilot (4). The 141-2, locked in at a position, can be looked at as a fixed restriction device, whereas, the 1356pilot is a variable restriction which is open unless air is present in the air eliminator. The 141-2 creates a pressure drop proportional to the flow through it and the flow through the 141-2is controlled by the degree of opening of the 1356 pilot. Next, we will look at two scenarios, Open 1356&Closed 1356

****Open 1356****When the1356 opens, there is a higher flow and proportionally higher pressure drop at the 141-2 needle. With this large flow and pressure drop at the 141-2, the pressure on the downstream of the 141-2 is decreased.

****Closed 1356****When the 1356 closes, the flow and pressure dropat the 141-2 decreases which then causes the 141-2 outlet pressure to increase.

Now note that the diaphragm chamber of the main valve (1) is connected downstream of the needle valve. In this manner, the pressure in the diaphragm chamber of the main valve is in fact controlled by the differential control pilot. As the diaphragm pressure decreases, the main valve opens; as the diaphragm pressure increases, the main valve closes.

Putting it all together, as air in the air eliminator increases above the set point of the differential control pilot, the pilot moves closed. This results in an increase in pressure in the diaphragm chamber of the main valve. The main valve then closes. Conversely, with no air in the air eliminator , the pilot moves further open. This results in a decrease in pressure in the diaphragm chamber of the main valve. The main valve then opens wide. The net result of all this is a constant action keeping valve open with no air in the air eliminator and valve closure when air is present.

**Note**: The air check function is active only when both solenoids are in the "opened" position.

TWO-STAGE CLOSING: Shutdown is initiated by the preset counter at acertain number of gallons before the end of the load. This number is adjustable in the preset. When the counter reaches this trip point, the **HI** output turns off which de--energizes the NC solenoid (3), closing it. Now full inlet pressure is directed to the diaphragm chamber of the main valve through the NO solenoid (2) and needle valve (5). The valve starts closed.

When the valve is nearly closed, the limit switch (7) contacts toggle from the "NO" position to the "NC" position. The preset control **LO** output will supply power through the now closed limit switch and will energize the NO solenoid, closing it. Now there is no flow either to or from the diaphragm chamber, and the valve is "hydraulically locked" in the low flow position. This is sometimes referred to as "dwell" flow.

When the preset counter reaches the end of the load, the **LO** output turns off, the NO solenoid is deenergized open, and the valve travels the short distance to full closed.

## INSTALLATION

1. The 110-9S is furnished fully factory-assembled including all control line tubing.
2. Install the 110-9S on the discharge of the meter, observing the following:
   a. Before installing the valve, make sure there is no foreign material inside the valve.
   b. Make sure all tubing connections are secure.
   c. For ease of maintenance service of the valve and meter, it is recommended that an isolation valve be installed upstream of the meter.
3. Make sure the voltage of the solenoids matches that of the preset outputs.
4. Complete all wiring between the preset and valve as shown on the wiring diagram. Make sure that the wiring and conduit is appropriate for hazardous locations.

## STARTUP AND ADJUSTMENTS

The following procedures should be followed for startup of the 110-9S. The air check pilot will be factory set using standard setpoint as shown in below table, unless a specific setpoint has been provided with customer order. **The standard spring for the air check pilot is green with a 5-30 psi adjustment range.**

| Part Number | Color | Spring Range | Standard Pressure Setting |
|---|---|---|---|
| 651701 | Green | 5-30 PSI | 20 PSI |
| 651703 | Red (Rnd Wire) | 20-80 PSI | 60 PSI |
| 651000 | Red (Square Wire) | 20-200 PSI | 60 PSI |
| 651704 | Yellow | 65-180 PSI | 80 PSI |
| 651702 | Blue | 100-300 PSI | 175 PSI |

**If the air check pilot is factory set** and does not require adjustment, skip steps2, 3, 8, 9, &10. Note that if field adjustments are made to needle valve(5), all Startup and Adjustment steps should be performed to assure correct pressure setting and valve opening and closing speeds.

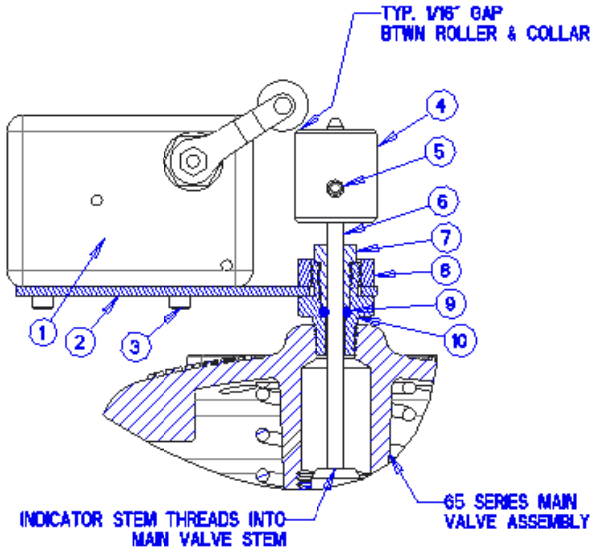
1. Connect the loading arm to a truck or other receiving vessel.
2. Remove the plastic cap from the air check pilot, and loosen the adjusting screw jam nut. Turn the adjusting screw fully clockwise.
3. From the factory the needle should be set and locked at 4 turns opened. Do not make any adjustments unless required in step 12.
   **Caution**: Adjusting the needle valve will affect both the opening and closing speed. Opening speed may not be affected if a large enough N.C solenoid orifice has been selected.
4. Perform limit switch adjustments as shown in the "Summary of Adjustments" section.
5. Start the system by dialing in the number of gallons to be loaded and actuating the lever on the preset counter. The valve should open slightly.
6. Carefully loosen a pipe plug on the main valve bonnet until fluid appears around the threads. When only clear fluid (no air) is discharging, retighten the plug.
7. Slowly turn the adjusting screw of the air check pilot(4) counter clockwise until the valve opens.
8. Allow the load to complete and run several more loads to check for proper two stage closing operation and proper 110-9S opening and closing speeds.
9. If the load overshoots, closing speed adjustments can be made via the needle valve per step 12 or in some preset controller'sper step 13.
10. Needle valve speed adjustments:
    a. To increase closing and slow opening speed, turn the needle valve (5) knob counter-clockwise ¼ turn.
    **Caution:** Too much adjustment will prevent opening of main valve. Adjust needle valve knob in ¼ turn increments.
    b. To slow closingand increase opening speed, turn the needle valve knob clockwise ¼ turn. Do not close completely. Adjustment will increase the opening speed.
    **Note**: After any adjustments are made to the needle valve, a test load should be performed to validate proper opening/closing speeds.
11. The HI output OFF setting in a preset can sometimes be adjusted to prevent overshooting the load run. This is the preferred method of closing speed adjustment. Follow preset controller instructions for more details.
12. After the 110-9S operation is verified through several filling cycles, tighten the adjusting screw jam nut on the air check pilot and replace plastic cap.

## SUMMARY OF ADJUSTMENTS

1. Air check pilot (4):
   a. Clockwise to increase closing bias.
   b. Counter-clockwise to decrease closing bias.
2. Needle valve (5):
   a. Clockwise– closing fullywill prevent the main valve from closing at end of load.
      - Decreases valve closing speed& increases the valve opening speed.
   b. Counter-clockwise – opening fully will prevent main valve from opening at beginning of load.
      - Increases valve closing speed.
      - May slowor prevent valve opening speed if turned too far Counter-clockwise:Needle valve is supplying more fluid to main valve bonnet than the N.C solenoid can exhaust to downstream. This will be

seen as a lower than expected flow during HI flow filling because the main valve is not allowed to opened fully. .

3. Low flow position: Refer to diaphragm below. The valve's low flow position may be adjusted by loosening the 1/8" allen set screw (item 5) in the collar (item 4) on the indicator stem (item 6). From the factory, the limit switch roller arm is placed approximately 1/8" above the collar as a starting point.
   a. Lower the collar to increase the low flow rate
   b. Raise the collar to decrease the low flow rate.




## MAINTENANCE

Required maintenance of the 110-9S is minimal. However, the following steps, periodically performed, will do much to keep the valve operating efficiently and properly.

1. Check for leaks at fittings and around flanges. Tighten as required.
2. Check for chipped or peeling paint. Touch up as required.
3. Check that all electrical wiring is secure.

## TROUBLESHOOTING

In the event of malfunction of the110-9S, the following outline should enable the technician to isolate the cause of the problem and to take the appropriate corrective action.

### MAIN VALVE FAILS TO OPEN

1. N.C. solenoid (3) not energized — Check control signals from preset.
2. N.C. solenoid (3) stuck closed or coil burned out — Replace coil. See the Solenoid Valve section of this manual.
3. Diaphragm of main valve (1) ruptured or stem binding — See Model 65 Basic Valve section of this manual.
4. Needle Valve (5) adjusted too far counter-clockwise — See Adjustment Instructions.
5. Air check pilot (4) adjusted too far clockwise — See Adjustment Instructions.
6. Stem of pressure air check pilot binding — Disassemble pilot and determine cause. See the 1356 Pilot section of this manual

### MAIN VALVE FAILS TO CLOSE

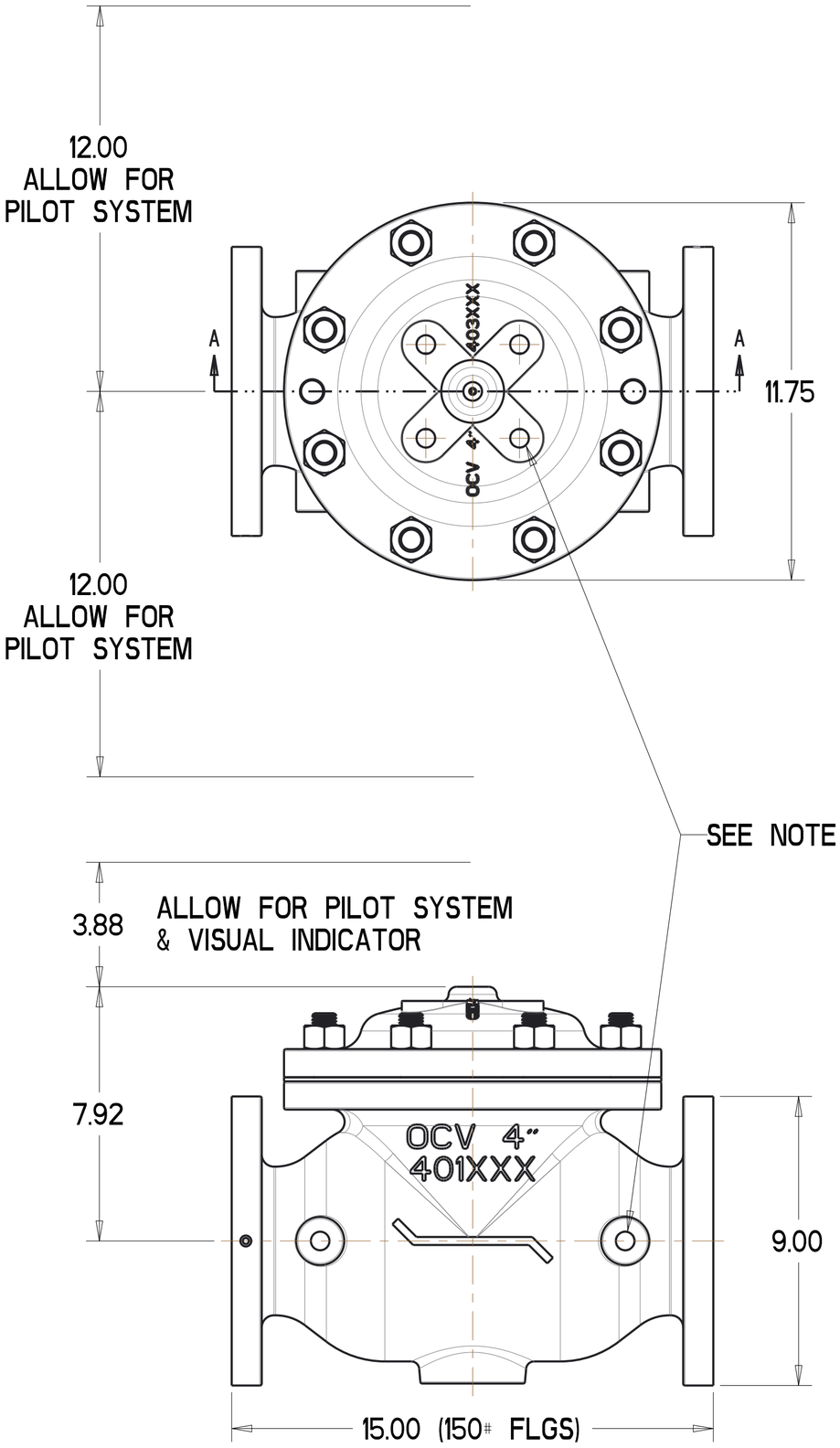
1. N.C. solenoid (3) not deenergized — Check control signals from preset.
2. N.O. solenoid (2) energized — Check control signals from preset.
3. N.C. solenoid (3) stuck open — Disassemble and determine cause. See the Solenoid Valve section of this manual.
4. N.O. solenoid (2) stuck closed — Disassemble and determine cause. See the Solenoid Valve section of this manual.
5. Stem of main valve (1) binding — See the Model 65 Basic Valve section of this manual.
6. Air check pilot (4) diaphragm ruptured - Replace diaphragm. See the 1356 Pilot section of this manual.
7. Air check pilots (4) stem binding or seat deteriorated — Disassemble pilot and determine cause. See the 1356 Pilot section of this manual.
8. Needle Valve closed all the way – re-adjust per "startup and adjustments" section.
9. Inline strainer dirty – remove strainer and clean or replace. Located in upstream side port of main valve.

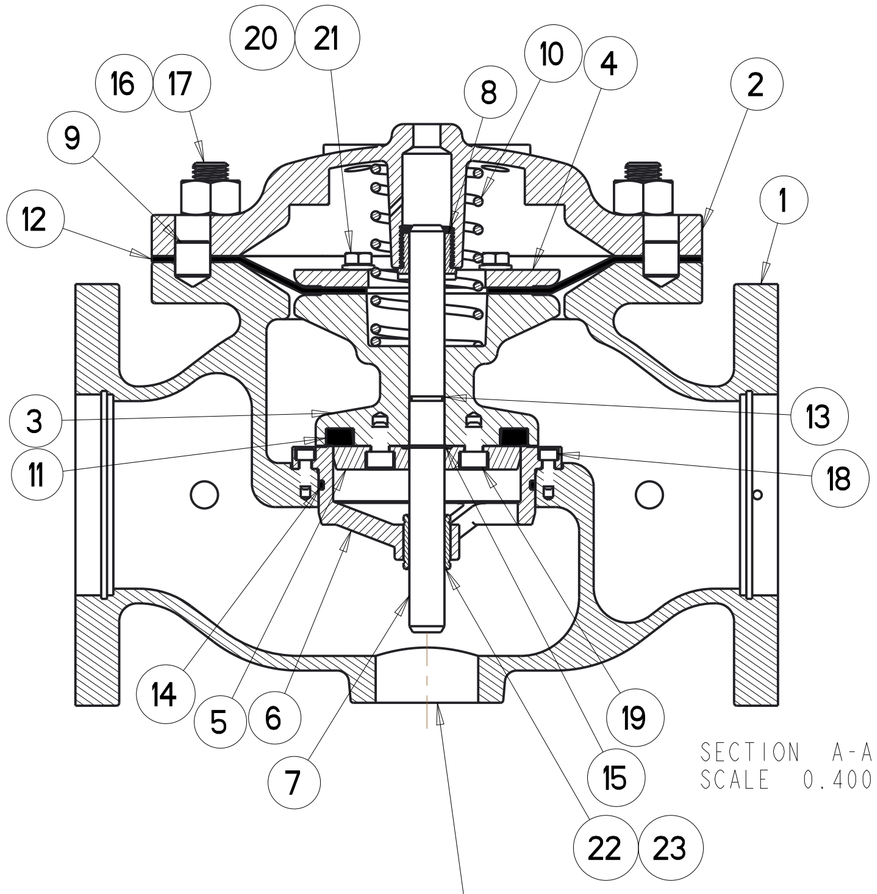
### VALVE SKIPS LOW FLOW POSITION ON SHUTDOWN

1. N.O. solenoid (2) not being energized. — Check signals from preset.
2. Coil of N.O. solenoid (2) burned out — Replace coil. See the Solenoid Valve section of this manual.
3. N.O. solenoid (2) stuck open — Disassemble and determine cause. See the Solenoid Valve section of this manual.

### VALVE DOES NOT GO TO FULL SHUT-OFF

1. N.O. solenoid (2) not being deenergized — Check signals from preset.
2. N.O. solenoid (2) stuck closed — Disassemble and determine cause. See the Solenoid Valve section of this manual.
3. Seat of main valve (1) damaged. — See the Model 65 Basic Valve section of this manual.

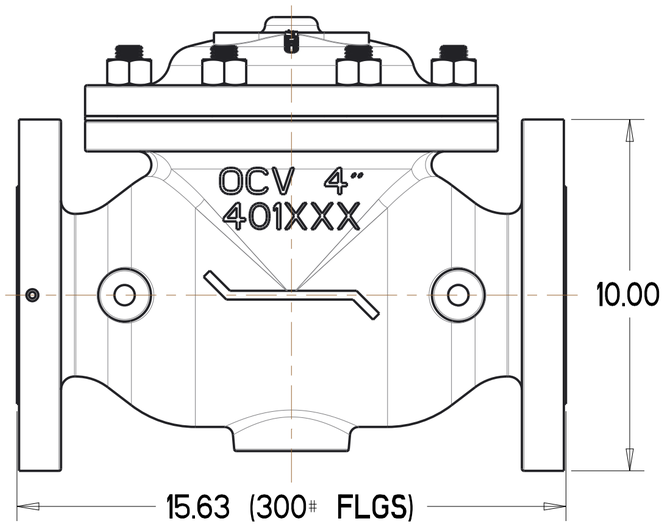



| ITEM | QTY | DESCRIPTION |
|---|---|---|
| 1 | 1 | BODY |
| 2 | 1 | BONNET |
| 3 | 1 | SPOOL |
| 4 | 1 | DIAPHRAGM PLATE |
| 5 | 1 | SEAT RETAINER |
| 6 | 1 | SEAT RING |
| 7 | 1 | STEM |
| 8 | 1 | BUSHING,UPPER |
| 9 | 2 | DOWEL PIN |
| 10 | 1 | SPRING |
| 11 | 1 | SEAT DISC |
| 12 | 1 | DIAPHRAGM |
| 13 | 1 | O-RING, STEM |
| 14 | 1 | O-RING, SEAT RING |
| 15 | 1 | SNAP-RING/SPLIT-RING, STEM |
| 16 | 8 | STUD |
| 17 | 8 | NUT,HEX |
| 18 | 6 | CAPSCREW, SEAT RING |
| 19 | 4 | CAPSCREW, SEAT RETAINER |
| 20 | 6 | CAPSCREW, DIAPHRAGM PLATE |
| 21 | 6 | WASHER, LOCK, DIAPHRAGM PLATE |
| 22 | 1 | BUSHING, LOWER (SS SEATS ONLY) |
| 23 | 2 | SNAP RING (SS SEATS ONLY) |

NOTES:
1. EXTERNAL/INTERNAL COATING & MATERIALS PER OCV MATERIAL OF CONSTRUCTION SHEET
2. ABS DESIGN APPROVED
3. UL LISTED DESIGN
4. TOTAL OF (9) 3/8-18 NPTF PIPE TAPS ARE PROVIDED FOR THE PILOT SYSTEM AND ACCESSORIES. (5) ON THE BONNET & (4) ON THE BODY.
5. ANGLE BODYS ARE ALSO AVAILABLE
6. WIDE OPEN CV: 200
7 VERTICAL STROKE: 1.4 INCHES




| | | | | | MATERIAL | TOLERANCES | | OCV Control Valves | |
|---|---|---|---|---|---|---|---|---|---|
| E | | | | | | UNLESS NOTED | | TULSA OKLAHOMA USA | |
| D | | | | | | .XX ±.015 | | | |
| C | | | | | | .XXX ±.005 | | 4" 65 SERIES GLOBE VALVE | |
| B | | | | | | ANGULAR ±0.5° | | | |
| A | | | | | | MACH FINISH 125 | | | |
| | | | | | NO. REQ'D | DRAWN BY | DATE | SIZE | DRAWING NUMBER / REV |
| CHG | ECN | DATE | BY | | | JRK | 10-27-2016 | C | 4400D |
| REVISIONS | | | | REF DWG NO'S | SCALE 0.300 | CHKD BY | DATE | | |

**Installation, Operating, and Maintenance Instructions**

# Model 65/765

## basic control valve

## GENERAL DESCRIPTION

The OCV Series 65 is a hydraulically operated, diaphragm-actuated valve, *full port* valve. The globe configuration (Model 65) is available in sizes 1 ¼" thru 16" and 24". The angle configuration (Model 65A) is available in sizes 1 ¼" thru 12" and 16".

The Series 765 is the same as the Series 65, except that it is a *reduced port* valve. It is available only in the globe configuration in sizes 3" thru 24".

The diaphragm is nylon-fabric bonded with synthetic rubber and forms a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. A synthetic rubber seat disc forms a tight seal with the valve seat when pressure is applied above the diaphragm.

## FUNCTIONAL DESCRIPTION

Because the Series 65/765 is a hydraulically operated valve, it requires a minimum line pressure of approximately 5 psig in order to function. The valve functions on a simple principle of pressure differential. The line pressure at the inlet of the valve is bypassed through the pilot control piping to the diaphragm chamber of the valve. This pressure, together with the valve spring, works against the pressure under the valve seat. Because the effective area of the diaphragm is greater than that of the seat, the valve is held tightly closed. As the controlling pilot(s) allow the pressure to bleed off the diaphragm chamber, the two opposing pressures begin to balance and the valve will begin to open. The valve can be used to perform a simple on-off function, or with the proper pilot system, a modulating, or regulating function.

In cases where the line fluid is unusually dirty, or is otherwise unsuitable for operating the valve, an independent operating pressure source may be employed. The pressure available from such a source must be equal to, or greater than, line pressure.

## INSTALLATION

In order to insure safe, accurate and efficient operation of the OCV control valve, the following list of checkpoints and procedures should be followed when installing the valve.

1. Make a careful visual inspection of the valve to insure that there has been no damage to the external piping, fittings or controls. Check that all fittings are tight.
2. Thoroughly flush all interconnecting piping of chips, scale and foreign matter prior to mounting the valve.

**CAUTION: Take appropriate care to protect personnel and equipment when lifting the valve for uncrating and for installation. Use appropriate lifting equipment. Lifting eyes are provided on 8" and larger valves to facilitate this task.**

3. Install the valve in the line according to the flow arrow on the inlet flange. The arrow should point downstream.
4. When installing flanged-end valves, use the proper number and size of flange bolts when installing the valve (see Tables 1 & 2). Make sure flange gaskets are of the proper material for the service. To ensure a tight seal, flange bolts should be tightened evenly in a criss-cross pattern. Tables 1 & 2 also shows the proper final torque values for the flange bolts.

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5. Allow sufficient room around the valve for ease of adjustment and maintenance service.
6. After the lines are filled with liquid, bleed all air from the diaphragm chamber. This can be done by carefully loosening a pipe plug in the bonnet until fluid begins to appear around the threads. When only clear liquid (no air) is flowing, retighten the plug.

In addition, it is highly recommended that:

1. Isolation valves (e.g., gate or butterfly) be installed on the inlet and discharge sides of the valve to facilitate isolating the valve for maintenance.
2. Pressure gauges be installed at the inlet and outlet sides of the valve to provide monitoring of the valve during initial start-up and during operation. The body side ports, if unused by the pilot system, provide a convenient connection for the gauges.
3. All valves larger than 6" be installed horizontally, i.e., with the bonnet pointed up, for ease of adjustment and maintenance servicing.

## MAINTENANCE

The OCV control valve requires no lubrication and a minimum of maintenance. However, a periodic inspection should be established to determine how the fluid being handled is affecting the efficiency of the valve. In a water system, for example, the fluid velocity as well as the substances occurring in natural waters, such as dissolved minerals and suspended particles, vary in every installation. The effect of these actions or substances must be determined by inspection. It is recommended that an annual inspection, which includes examination of the valve interior, be conducted. Particular attention should be paid to the rubber parts, i.e., the diaphragm and seat disc. Any obviously worn parts should be replaced.

## REPAIR PROCEDURES

In the event of malfunction of the OCV control valve, troubleshooting should be conducted according to the procedures outlined for the specific model of valve. Then, if those steps indicate a problem with the main valve, this section will outline the procedures necessary to correct the problem.

Problems with the main valve can be classed in three basic categories:

### 1. VALVE FAILS TO OPEN

a. Diaphragm damaged* - See Procedure A
b. Stem binding - See Procedure B

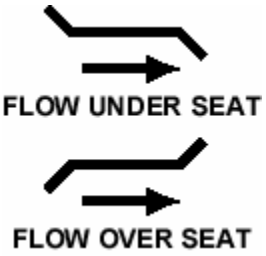
### 2. VALVE FAILS TO CLOSE

a. Diaphragm damaged* - See Procedure A
b. Stem binding - See Procedure B
c. Object lodged in valve - See Procedure B

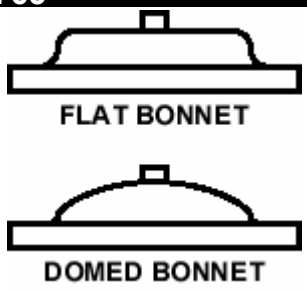
### 3. VALVE OPENS AND CLOSES BUT LEAKS WHEN CLOSED

a. Seat disc damaged - See Procedure C
b. Seat ring damaged - See Procedure D

**A diaphragm failure can prevent the valve from either opening or closing, depending on the flow direction. Most water service valves flow "under the seat", in which case a diaphragm failure will keep the valve from closing. On the other hand, most fuel service valves flow "over the seat", in which case a diaphragm failure will keep the valve from opening. To determine which you have, examine the bridge mark cast into the side of the valve body, and then compare it with the figures below.*




***IMPORTANT:*** Over the years, OCV has made significant design changes to the 3", 4", 8", 10" and 12" valves. Therefore, before ordering rubber kits or other parts, you will need to determine which style valve you have (old or new). This can be easily determined by looking at the valve *bonnet*. As shown below, old-style valves have flat bonnets; new-style valves (except for the 3" full port and 4" reduced port valves) have domed bonnets.




For 3" valves, simply measure the *diameter* of the bonnet. Old-style bonnets have a 7-11/16" (195 mm) diameter; new style bonnets have an 8-3/4" (222 mm) diameter. That same 8-3/4" diameter flat bonnet is also used on the 4" reduced port valve.

**PROCEDURE A: DIAPHRAGM REPLACEMENT**

1. Wear appropriate clothing and equipment to protect the skin and eyes from exposure to the line fluid.
2. Isolate the valve from the system by closing upstream and downstream block valves.
3. Bleed all pressure from the valve.

**WARNING! IT IS EXTREMELY IMPORTANT THAT ALL PRESSURE BE REMOVED FROM THE VALVE BEFORE DOING EVEN PARTIAL DISASSEMBLY.**

4. Loosen one of the tubing connections on the bonnet. Allow any residual pressure to bleed off.
5. To minimize any possible fluid spillage, drain the upstream and downstream sides of the valve as much as possible. Unused side ports in the main valve body can be used for this purpose. They will bring the fluid level down to approximately the centerline of the piping.
6. Remove all tubing connected at the bonnet.
7. Remove the bonnet nuts.
8. Remove the bonnet. If the bonnet sticks in place, it may be loosened by rapping sharply around its edge with a rubber-headed mallet. NOTE: 8" and larger valves are equipped with eye bolts through which a chain can be fastened to aid in lifting the bonnet.
9. Remove the spring.
10. Remove the diaphragm plate capscrews and the diaphragm plate.
11. Remove the old diaphragm.
12. Making sure the dowel pin holes are in the proper location, place the new diaphragm over the studs and press down until it is flat against the body and spool.
13. Replace the diaphragm plate and the diaphragm plate capscrews.
14. Tighten all diaphragm plate capscrews snugly. See Table 4 for proper torque values.
15. Replace the spring.
16. Replace the bonnet and reinstall the bonnet nuts.
17. Tighten the bonnet nuts snugly using a criss-cross tightening pattern. See Table 3 for torque requirements.
18. Reinstall the control tubing.
19. Reopen the upstream and downstream block valves.
20. Before placing the valve back in service, perform the air bleed procedure described in the Installation section of this manual.

**PROCEDURE B: CORRECTION OF BINDING STEM**

1. Perform Steps 1 thru 9 of Procedure A, above.
2. Remove the spool assembly from the valve. NOTE: On smaller valves, this can be accomplished simply by grasping the stem and pulling upward. Valves 6" and larger have the top of the stem threaded to accept an eyebolt to aid in lifting the spool out of the body. 6" thru 12" valves are threaded 3/8-16. 14" and 16" valves are threaded 5/8-11. The 24" valve is threaded 3/4-10.
3. Carefully examine both ends of the stem for deep scratches, scoring or buildup of mineral deposits. Polish the stem if necessary using a fine grade of emery cloth.
4. Similarly, examine and polish the upper bushing (in the bonnet) and the lower guide (in the seat ring).
5. Reinstall the spool assembly.
6. Reassemble the valve, following Steps 15 thru 20 in Procedure A.

**PROCEDURE C: SEAT DISC REPLACEMENT**

1. Perform Steps 1 and 2 of Procedure B, above.
2. With the spool assembly removed from the body, remove the seat retainer screws.

3. Slide the seat retainer off the lower end of the stem.
4. Remove the seat disc from its groove in the spool. NOTE: The seat disc may fit quite tightly in the groove. If necessary, it may be pried out using a thin-bladed screwdriver or similar tool.
5. Install the new seat disc in the groove.
6. Reinstall the seat retainer and tighten the seat retainer screws.
7. Reassemble the valve, following Steps 5 and 6 of Procedure B.

**PROCEDURE D: SEAT RING REPLACEMENT**

*NOTE: It is rare for a seat ring to require replacement. Minor nicks and scratches in the seating surface can usually be smoothed out with emery cloth.*

1. Perform Steps 1 and 2 of Procedure B, above.
2. If you are working on a 3" or smaller valve, or a 4" old-style valve, follow Steps 4 thru 9, below.
3. If you are working on a new-style 4" valve, or any valve 6" or larger, follow Steps 10 thru 16, below.
4. Seat rings in the smaller valves are threaded into the valve body. To remove, you will need a special seat ring tool. One may be purchased from OCV, or one may be fabricated. (See Table 5 for details.)
5. Using the seat ring tool, unthread the seat ring from the body.
6. Remove the old o-ring from the counterbore in the body.
7. Install the new o-ring in the counterbore.
8. Using the seat ring tool, install the new seat ring.
9. Reassemble the valve, following Steps 5 & 6 of Procedure B.
10. Seat rings on larger valves are bolted into the body with socket head capscrews. In addition you will note that the seat ring is equipped with additional threaded holes that may be used for "jacking" the seat ring out of the body.
11. Remove the socket head capscrews.
12. Remove the old seat ring from the body by temporarily installing two or more of the capscrews in the "jacking" holes.
13. Install a new o-ring in the groove of the new seat ring. Lubricate the o-ring and outer seat ring wall with Vaseline® or similar lubricant.
14. Install the new seat ring in the body, making sure that the capscrew holes line up.
15. Replace and tighten all the capscrews.
16. Reassemble the valve, following Steps 5 and 6 of Procedure B.

## TABLE 1
## FLANGE BOLTING REQUIREMENTS – CLASS 150 FLANGES

| VALVE SIZE (DN) | NO. OF BOLTS | BOLT SIZE | RECOMMENDED TORQUE (FT-LB) | RECOMMENDED TORQUE (N-M) |
|---|---|---|---|---|
| 1 ¼" (32) | 4 | 1/2-13 X 2.50" LONG | 75 | 102 |
| 1 ½" (40) | 4 | 1/2-13 X 2.50" LONG | 75 | 102 |
| 2" (50) | 4 | 1/2-13 X 2.50" LONG | 75 | 102 |
| 2 ½" (65) | 4 | 5/8-11 X 3.00" LONG | 150 | 204 |
| 3" (80) | 4 | 5/8-11 X 3.25" LONG | 150 | 204 |
| 4" (100) | 8 | 5/8-11 X 3.25" LONG | 150 | 204 |
| 6" (150 | 8 | 3/4-10 X 3.50" LONG | 250 | 339 |
| 8" (200) | 8 | 3/4-10 X 3.75" LONG | 250 | 339 |
| 10" (250) | 12 | 7/8-9 X 4.00" LONG | 378 | 513 |
| 12"(300) | 12 | 7/8-9 X 4.25" LONG | 378 | 513 |
| 14" (350) | 12 | 1-8 X 4.50" LONG | 583 | 791 |
| 16" (400) | 16 | 1-8 X 4.75" LONG | 583 | 791 |
| 18" (450) | 16 | 1 1/8" X 5.00" LONG | 782 | 1061 |
| 20" (500) | 20 | 1 1/8 X 5.50" LONG | 782 | 1061 |
| 24" (600) | 20 | 1 1/4"-7 X 6.00" LONG | 1097 | 1488 |

## TABLE 2
## FLANGE BOLTING REQUIREMENTS – CLASS 300 FLANGES

| VALVE SIZE (DN) | NO. OF BOLTS | BOLT SIZE | RECOMMENDED TORQUE (FT-LB) | RECOMMENDED TORQUE (N-M) |
|---|---|---|---|---|
| 1 ¼" (32) | 4 | 5/8-11 X 2.75" LONG | 150 | 204 |
| 1 ½" (40) | 4 | 3/4-10 X 3.00" LONG | 250 | 339 |
| 2" (50)* | 6<br>2 | 5/8-11 X 3.00" LONG<br>5/8-11 X 2.25" LONG | 150<br>150 | 204<br>204 |
| 2 ½" (65) | 8 | 3/4-10X 3.25" LONG | 250 | 339 |
| 3" (80) | 8 | 3/4-10 X 3.50" LONG | 250 | 339 |
| 4" (100) | 8 | 3/4-10 X 3.75" LONG | 250 | 339 |
| 6" (150) | 12 | 3/4-10 X 4.25" LONG | 250 | 339 |
| 8" (200) | 12 | 7/8-9 X 4.75" LONG | 378 | 513 |
| 10" (250) | 16 | 1-8 X 5.50" LONG | 583 | 791 |
| 12"(300) | 16 | 1 1/8-7 X 5.75" LONG | 782 | 1061 |
| 14" (350) | 20 | 1 1/8-7 X 6.25" LONG | 782 | 1061 |
| 16" (400)* | 18<br>2 | 1 1/4-7 X 6.50" LONG<br>1 1/4-7 X 5.50" LONG | 1097<br>1097 | 1488<br>1488 |
| 18" (450) | 24 | 1 1/4-7 X 6.75" LONG | 1097 | 1488 |
| 20" (500) | 24 | 1 1/4-7 X 7.25" LONG | 1097 | 1488 |
| 24" (600) | 24 | 1 1/2-6 X 8.00" LONG | 1750 | 2375 |

* TOP TWO HOLES ON VALVE FLANGES ARE DRILLED & TAPPED. USE THE SHORTER BOLTS LISTED IN THESE HOLES.

## TABLE 3
## BONNET BOLTING TORQUE SPECIFICATIONS
## NEW-STYLE FULL PORT VALVES (SERIES 65)

| VALVE SIZE (DN) | NO. OF STUDS | STUD SIZE | REC. TORQUE FT-LB (N-M) | VALVE SIZE (DN) | NO. OF SCREWS | SCREW SIZE | REC. TORQUE FT-LB (N-M) |
|---|---|---|---|---|---|---|---|
| 1 ¼" (32) | 8 | 3/8-16 | 31 (42) | 8" (200) | 12 | 7/8-9 | 378 (513) |
| 1 ½" (40) | 8 | 3/8-16 | 31 (42) | 10" (250) | 16 | 7/8-9 | 378 (513) |
| 2" (50) | 8 | 3/8-16 | 31 (42) | 12" (300) | 20 | 1 1/8-7 | 782 (1061) |
| 2 ½" (65) | 8 | 1/2-13 | 75 (102) | 14" (350) | 20 | 1 1/8-7 | 782 (1061) |
| 3" (80) | 8 | 1/2-13 | 75 (102) | 16" (400) | 20 | 1 1/4-7 | 1097 (1488) |
| 4" (100) | 8 | 3/4-10 | 250 (339) | 24" (400) | 28 | 1 1/2-6 | 1750 (2375) |
| 6" (150) | 12 | 3/4-10 | 250 (339) | | | | |

## NEW-STYLE REDUCED PORT VALVES (SERIES 765)

| VALVE SIZE (DN) | NO. OF STUDS | STUD SIZE | REC. TORQUE FT-LB (N-M) | VALVE SIZE (DN) | NO. OF SCREWS | SCREW SIZE | REC. TORQUE FT-LB (N-M) |
|---|---|---|---|---|---|---|---|
| 3" (80) | 8 | 3/8-16 | 31 (42) | 12" (300) | 16 | 7/8-9 | 378 (513) |
| 4" (100) | 8 | 1/2-13 | 75 (102) | 16" (250) | 20 | 1 1/8-7 | 782 (1061) |
| 6" (150) | 8 | 3/4-10 | 250 (339) | 18" (300) | 20 | 1 1/4-7 | 1097 (1488) |
| 8" (200) | 12 | 3/4-10 | 250 (339) | 20" (350) | 20 | 1 1/4-7 | 1097 (1488) |
| 10" (250) | 12 | 7/8-9 | 378 (513) | 24" (400) | 20 | 1 1/4-7 | 1097 (1488) |

## OLD-STYLE FULL PORT VALVES (SERIES 65)

| VALVE SIZE (DN) | NO. OF SCREWS | STUD SIZE | REC. TORQUE FT-LB (N-M) | VALVE SIZE (DN) | NO. OF SCREWS | SCREW SIZE | REC. TORQUE FT-LB (N-M) |
|---|---|---|---|---|---|---|---|
| 3" (80) | 8 | 3/8-16 | 31 (42) | 10" (250) | 16 | 3/4-10 | 250 (339) |
| 4" (100) | 8 | 7/16-20 | 50 (68) | 12" (300) | 20 | 1 1/8-7 | 782 (1061) |
| 8" (200) | 12 | 3/4-10 | 250 (339) | | | | |

## TABLE 4
## DIAPHRAGM PLATE CAPSCREW TORQUE SPECIFICATIONS
## NEW-STYLE FULL PORT VALVES (SERIES 65)

| VALVE SIZE (DN) | NO. OF SCREWS | SCREW SIZE | REC. TORQUE FT-LB (N-M) | VALVE SIZE (DN) | NO. OF SCREWS | SCREW SIZE | REC. TORQUE FT-LB (N-M) |
|---|---|---|---|---|---|---|---|
| 1 ¼" (32) | 1 | 3/8-24 N | 21.5 (29) | 8" (200) | 8 | 1/2-13 H | 43 (58) |
| 1 ½" (40) | 1 | 3/8-24 N | 21.5 (29) | 10" (250) | 12 | 1/2-13 H | 43 (58) |
| 2" (50) | 4 | 1/4-20 A | 6.3 (8.6) | 12" (300) | 12 | 1/2-13 H | 43 (58) |
| 2 ½" (65) | 6 | 10-32 A | 2.7 (3.7) | 14" (350) | 16 | 3/8-16 H | 19.7 (27) |
| 3" (80) | 6 | 1/4-20 A | 6.3 (8.6) | 16" (400) | 16 | 1/2-13 H | 43 (58) |
| 4" (100) | 6 | 3/8-16 H | 19.7 (27) | 24" (400) | 16 | 1-8 H | 286 (383) |
| 6" (150) | 8 | 3/8-16 H | 19.7 (27) | | | | |

## NEW-STYLE REDUCED PORT VALVES (SERIES 765)

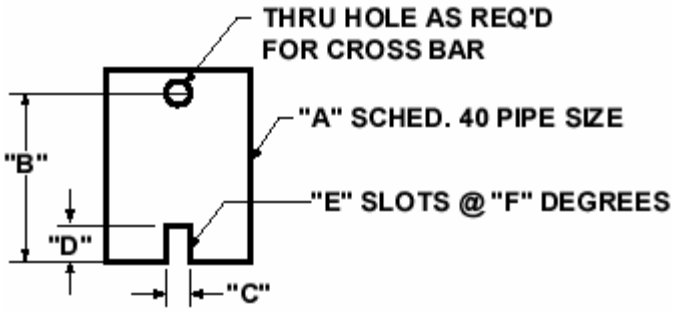
| VALVE SIZE (DN) | NO. OF SCREWS | SCREW SIZE | REC. TORQUE FT-LB (N-M) | VALVE SIZE (DN) | NO. OF SCREWS | SCREW SIZE | REC. TORQUE FT-LB (N-M) |
|---|---|---|---|---|---|---|---|
| 3" (80) | 4 | 1/4-20 A | 6.3 (8.6) | 12" (300) | 12 | 1/2-13 H | 43 (58) |
| 4" (100) | 6 | 1/4-20 A | 6.3 (8.6) | 16" (250) | 12 | 1/2-13 H | 43 (58) |
| 6" (150) | 6 | 3/8-16 H | 19.7 (27) | 18" (300) | 12 | 1/2-13 H | 43 (58) |
| 8" (200) | 8 | 3/8-16 H | 19.7 (27) | 20" (350) | 12 | 1/2-13 H | 43 (58) |
| 10" (250) | 8 | 1/2-13 H | 43 (58) | 24" (400) | 12 | 1/2-13 H | 43 (58) |

## OLD-STYLE FULL PORT VALVES (SERIES 65)

| VALVE SIZE (DN) | NO. OF SCREWS | SCREW SIZE | REC. TORQUE FT-LB (N-M) | VALVE SIZE (DN) | NO. OF SCREWS | SCREW SIZE | REC. TORQUE FT-LB (N-M) |
|---|---|---|---|---|---|---|---|
| 3" (80) | 4 | 1/4-20 H | 6.3 (8.6) | 10" (250) | 12 | 3/8-16 H | 19.7 (27) |
| 4" (100) | 6 | 1/4-20 H | 6.3 (8.6) | 12" (300) | 12 | 1/2-13 H | 43 (58) |
| 8" (200) | 8 | 3/8-16 H | 19.7 (27) | | | | |

N = SINGLE HEX NUT ON VALVE STEM
A = ALLEN-HEAD CAPSCREWS
H = HEX-HEAD CAPSCREWS

## TABLE 5
## SEAT RING TOOL DETAILS




| VALVE SIZE FULL PORT | VALVE SIZE RED. PORT | "A" PIPE SIZE | "B" MIN. LENGTH | "C" SLOT WIDTH | "D" SLOT DEPTH | "E" # SLOTS | "F" SPACING |
|---|---|---|---|---|---|---|---|
| 1 1/4" | -- | 3/4 | 6" | 3/8" | 3/8" | 2 | 180° |
| 1 1/2" | -- | 3/4 | 6" | 3/8" | 3/8" | 2 | 180° |
| 2" | 3" | 1 1/2 | 7" | 3/8" | 3/8" | 2 | 180° |
| 2 1/2" | -- | 2 | 8" | 1/2" | 1/2" | 3 | 120° |
| 3" NEW | 4" | 2 1/2 | 9" | 1/4" | 3/8" | 3 | 120° |
| 3" OLD | -- | 2 1/2 | 9" | 5/8" | 5/8" | 2 | 180° |
| 4" OLD | -- | 3 | 10" | 5/8" | 5/8" | 2 | 180° |

# DIFFERENTIAL PRESSURE PILOT 1356

## DESCRIPTION

MODEL 1356 DIFFERENTIAL PRESSURE

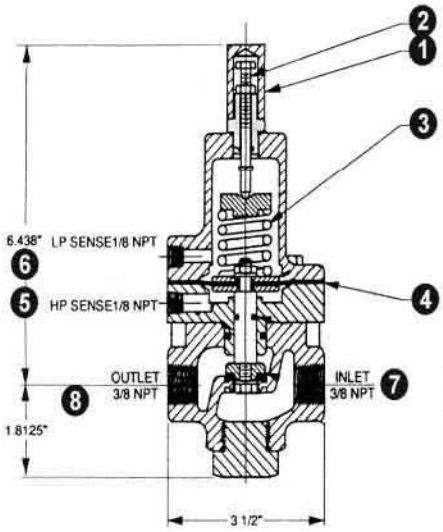
- Normally closed, increasing differential pressure opens
- Multiple spring ranges for accurate control
- Can be local or remote sensed
- Simple adjustment
- All parts replaceable while mounted on valve
- Rubber to metal seat for positive shut-off
- Bronze or stainless steel construction

The Model 1356 is a two-way, normally closed pilot, that senses high pressure under its diaphragm, low pressure above the diaphragm, and balances the differential pressure against an adjustable spring load. An increase in differential above the spring set point tends to make the pilot open.

The Model 1356 is the standard pilot for OCV Series 110 Differential Control Valve. Sensing high and low pressures and opening at the differential set point, the pilot modulates the main valve to maintain the required differential pressure.

## MODEL 1356 MATRIX

| MATERIAL | PART NUMBER | INLET/OUTLET (NPT) | USED ON VALVE SIZE |
|---|---|---|---|
| Bronze, Buna-N | 230113 | 3/8 | 1 ¼"-6" |
| Bronze, Buna-N | 230165 | 1/2 | 8"-16" |
| Stn. Steel, Buna-N | 230713 | 3/8 | 1 ¼"-6" |
| Stn. Steel, Buna-N | 230723 | 1/2 | 8"-16" |



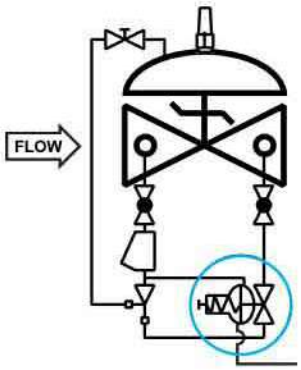

Model 1356 Differential Pressure Pilot:
1. Adjusting Screw Cover
2. Adjusting Screw
3. Spring
4. Diaphragm
5. High Pressure Sense
6. Low Pressure Sense
7. Pilot Inlet
8. Pilot Outlet

## SPRING RANGES

| PART NUMBER | COLOR | RANGE PSI | RANGE kPa |
|---|---|---|---|
| 651701 | Green | 5 - 30 | 35 - 210 |
| 651703 | Red | 20 - 80 | 140 - 560 |
| 651704 | Yellow | 65 - 180 | 450 - 1240 |
| 651702 | Blue | 100 - 300 | 700 - 2100 |

## SCHEMATIC SYMBOL

The Model 1356 is shown on OCV Valve Schematics as:




EXAMPLE: Shown here on a MODEL 110 Differential Pressure Valve

## MATERIALS

Bronze B61
Stainless Steel ASTM A743/CF8-M
Elastomers (diaphragm, seat disc, o-rings)
- Buna-N (Std.)
- Viton® (Opt.) Viton is a registered trademark of DuPont Dow Elastomers
- EPDM (Opt.)

## MAINTENANCE

Rubber components are typically the only parts that may require periodic replacement.
These are available in kits consisting of the diaphragm, the seat disc and all O-rings.
Buna-N Kit-Part # 930010
Viton® Kit-Part # 930110
EPDM Kit-Part # 930410

**TOLL FREE 1.888.628.8258** • **phone:** (918)627.1942 • **fax:** (918)622.8916 • 7400 East 42nd Place, Tulsa, OK 74145
**email:** sales@controlvalves.com • **website:** www.controlvalves.com



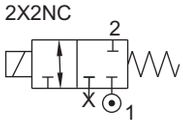
Differential Pressure Pilot 1356

ROTEX
Engineering For The Future

# 3/2 DIRECT ACTING HIGH ORIFICE/ UNIVERSAL SOLENOID VALVE

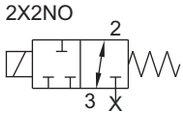
| TYPE | PRESSURE |
|---|---|
| 20106 | 0 - 10 bar |
| 20105 | 0 - 10 bar |
| | |

2X2NC



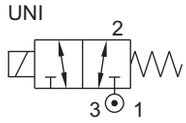

| TYPE | PRESSURE |
|---|---|
| 20206 | 0 - 10 bar |
| 20205 | 0 - 10 bar |
| | |

2X2NO




| TYPE | PRESSURE |
|---|---|
| 30308 | 0 - 10 bar |
| 30309 | 0 - 10 bar |
| 30329 | 0 - 16 bar |
| 30333 | 0 - 10 bar |

UNI

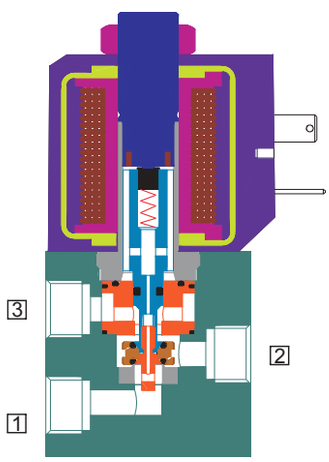



## FEATURES

- Bubble tight shut off
- Mounts in any position
- Suitable for vacuum up to $10^{-6}$ torr
- Vibration resistance up to 9g
- Suitable for high speed cycling
- Speed up to 800 cycles/ min
- Life >10 million cycles
- Manual override optionally provided

## WETTED PARTS

| Code | ※ | B1 | B2 | B5 |
|---|---|---|---|---|
| Body | Anodized Aluminium | Anodized Aluminium | Brass | SS 316 |
| Internals | Brass and SS 316 | SS 316 | Brass and SS 316 | SS 316 |
| Guide Assembly | SS 304 | | | |
| Shadow-Ring | None | | | |
| Plunger, Insert | SS 430 | | | |
| Spring | SS 302 | | | |
| Seat, Seals | NBR, Viton, Viton GLT, F.Silicon | | | |
| Fasteners | SS 304 | | | |




## AMBIENT AND FLUID TEMPERATURE

-30 °C to 75 °C

## SPECIAL VERSIONS AND SUFFIX

Suffix : (Valve) AM
Special versions : (Solenoid) CO, FR, SS, LC, III

## MEDIA

Air, Inert Gases, Water, Vacuum, Free Flowing Liquids, Oil, Diesel, Kerosene, LPG

## APPLICATION

Single acting actuator/ Cylinder, control valve actuation. Diverting/ mixing of fluid, analyzer, ESD

## PORT CONNECTION

| FUNCTION | INLET | OUTLET | EXHAUST |
|---|---|---|---|
| NC | 1 | 2 | 3 |
| NO | 3 | 2 | 1 |
| Mixing | 1 and 3 | 2 | |
| Diverting | 2 | 1 and 3 | |

Contact Rotex for
- Any other ambient, fluid temperature, media and application
- UL listed, ⓤⓛ Listed general purpose Valve

## SPARES

(Refer page 25 for ordering code)

| SPARE KIT | CODE |
|---|---|
| **Oring Kit :** Oring Set | P98 |
| **Repair Kit :** Oring Set, Plunger Assembly, Fastener, Springs, Manual Override, Guide Assembly, Piston Kit | 99 |
| **Solenoid Kit :** Solenoid, Gasket and Nut | 34 |

## APPROVAL

(* applied for)

| Approval | TYPE 4X, 6P | IP67 | Ex d IIC T4 or T5 or T6 IP66 | Ex ia IIC T6 IP67 | DGMS | CCOE |
|---|---|---|---|---|---|---|
| | | ✓ | ✓ | | ✓ | ✓ |
| CE | | ✓ | ✓ | | | |
| UL | ✓ | | * | | | |
| CEPEL | | | ✓ | | | |
| EAC | | | ✓ | | | |
| IECEx | | | ✓ | | | |

- Valve type 30309 and 30329 does not have shadowring
- Plugging exhaust port, Can be used as bi directional, 2/2 NC type 20105, 20106, 30308TC, 30333TC, 30309TC, 30329TC OR 2/2 NO type 20205, 20206, 30308TO, 30308TO, 30333TO, 30329TO
- For Valve type 30308 and 30333 operated with AC voltage select in built full rectifier 'FR' option
- Add Suffix SL for Ordering SIL capable Certified valve.

ROTEX
*Engineering For The Future*

# 3/2 DIRECT ACTING HIGH ORIFICE/ UNIVERSAL SOLENOID VALVE

## SPECIFICATION

| PORT CONNECTION | | | PRE-SSURE bar | | | | | | BODY MATERIAL AND INTERNALS | | | | SEALS | | | | | MANUAL OVERRIDE | | | SOLENOID ENCLOSURE | | | | | | | SUFFIX | | POWER VA | | | CONSTRUCTION REFERENCE NUMBER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | WEATHER PROOF | | | | EXPLOSION PROOF | | | | | | | | | | |
| SIZE | BSP(F) | NPT(F) | MINIMUM | MAXIMUM | ORIFICE (mm) | FLOW FACTOR kv (LPM OF WATER @ 1 bar ΔP) | VALVE TYPE | PILOT PRESSURE | ALUMINIUM | ALUMINIUM + SS | BRASS (STD. PORT NPT) | SS 316/ CF8 (STD. PORT NPT) | NBR | Viton | EPDM | Viton GLT | F.Silicon | NIL | STAYPUT CUM MOMENTARY | MOMENTARY | FLYING LEAD | PLUG IN, IP67 | SQ. PLUG IN, IP67 | TERMINAL BOX IP67 | EXPLOSION PROOF IIC, IP67 | LARGE ENCLOSURE | SOLENOID SIZE | OXYGEN | AMONIA | AC INRUSH | AC HOLDING | DC | |
| 3/2 UNIVERSAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1/4" | 2G | 2R | 0 | 10 | 5 | 5 | 30308 | | ※ | B1 | B2 | B5 | ※ | S2 | | S2GS19 | | ※ | M6 | M8 | | | 25 | T | E | III | 14 | ✓ | ✓ | 8 | 8 | 8 | 323 |
| | | | 0 | 10 | 7 | 14 | 30309 | | ※ | B1 | B2 | B5 | ※ | S2 | | S2GS19 | | ※ | M6 | M8 | | | 25 | T | E | | 18 | | ✓ | 15 | 15 | 15 | 324 |
| | | | 0 | 16 | 7 | 14 | 30329 | | ※ | B1 | B2 | B5 | ※ | S2 | | S2GS19 | | ※ | M6 | M8 | | | 25 | T | E | | 18 | | ✓ | 15 | 15 | 15 | 324 |
| 3/8" | 3G | 3R | 0 | 10 | 10 | 30 | 30309 | | ※ | B1 | B2 | B5 | ※ | S2 | | S2GS19 | | ※ | M6 | M8 | | | 25 | T | E | | 18 | | ✓ | 15 | 15 | 15 | 325 |
| | | | 0 | 10 | 7 | 14 | 30309 | | ※ | B1 | B2 | B5 | ※ | S2 | | S2GS19 | | ※ | M6 | M8 | | | 25 | T | E | | 18 | | ✓ | 15 | 15 | 15 | 324 |
| | | | 0 | 10 | 5 | 5 | 30333 | | | | B2 | B5 | ※ | S2 | | S2GS19 | | ※ | M6 | M8 | | | 25 | T | E | | 14 | ✓ | ✓ | 8 | 8 | 8 | 223 |
| | | | 0 | 16 | 7 | 14 | 30329 | | ※ | B1 | B2 | B5 | ※ | S2 | | S2GS19 | | ※ | M6 | M8 | | | 25 | T | E | | 18 | | ✓ | 15 | 15 | 15 | 324 |
| | | | 0 | 16 | 10 | 25 | 30329 | | ※ | B1 | B2 | B5 | ※ | S2 | | S2GS19 | | ※ | M6 | M8 | | | 25 | T | E | | 18 | | ✓ | 15 | 15 | 15 | 325 |
| 1/2" | 4G | 4R | 0 | 10 | 5 | 10 | 30333 | | | | B2 | B5 | ※ | S2 | | S2GS19 | | ※ | M6 | M8 | | | 25 | T | E | | 14 | ✓ | ✓ | 8 | 8 | 8 | 223 |
| | | | 0 | 10 | 10 | 30 | 30309 | | ※ | B1 | B2 | B5 | ※ | S2 | | S2GS19 | | ※ | M6 | M8 | | | 25 | T | E | | 18 | | ✓ | 15 | 15 | 15 | 325 |
| | | | 0 | 16 | 10 | 25 | 30329 | | ※ | B1 | B2 | B5 | ※ | S2 | | S2GS19 | | ※ | M6 | M8 | | | 25 | T | E | | 18 | | ✓ | 15 | 15 | 15 | 325 |

| Cable Entry | T | E | | | | |
|---|---|---|---|---|---|---|
| | | Ex d | | | Ex emb | |
| M20 x 1.5 | 19 | 39 | 87MS | | 58MS | 58LTMS |
| M25 x 1.5 | | | 87 | | 58 | 58LT |
| 1/2" NPT | 16 | 37 | 87NS | | 58NS | 58LTNS |

※ = Do not specify when opted for. Refer Page # 22 for Value of ※
✓= Options available

## ORDERING CODE AND EXAMPLE

**VALVE + SOLENOID**

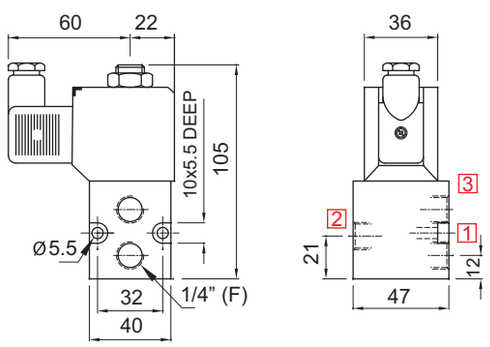
TYPE – SUFFIX – ORIFICE – PORT CONNECTION – BODY AND INTERNALS – MANUAL OVERRIDE – SEAL + SIZE – VOLTAGE – CURRENT – SOLENOID ENCLOSURE – APPROVAL – INSULATION – SPECIAL VERSION

e.g. 30309-7-2G+110V DC; 30308-5-2R-B5-S2+220V 50Hz-37-III-FR

## DIMENSIONS

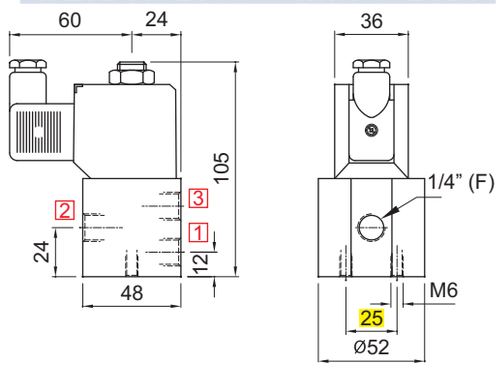
All Dimensions are in mm

### CONSTRUCTION REFERENCE : 323



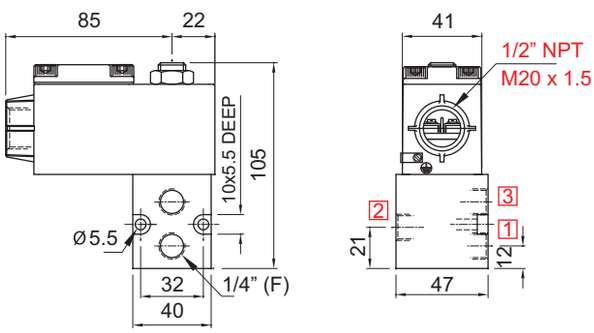

PLUG IN SOLENOID TYPE 22

### VALVE TYPE : 30308 WITH SS BODY



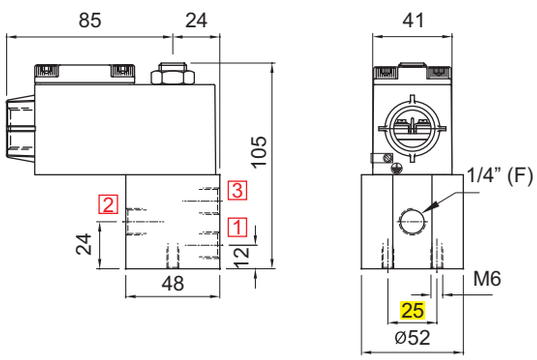

PLUG IN SOLENOID TYPE 22

### CONSTRUCTION REFERENCE : 323




TERMINAL BOX/ Ex d/ TYPE 16, 19, 37, 39, 58, 58LT

### VALVE TYPE : 30308 WITH SS BODY




TERMINAL BOX/ Ex d/ TYPE 16, 19, 37, 39, 58, 58LT

# 3/2 DIRECT ACTING HIGH ORIFICE/ UNIVERSAL SOLENOID VALVE

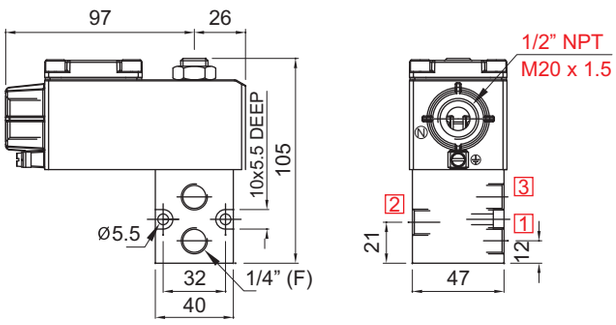
## DIMENSIONS

All Dimensions are in mm

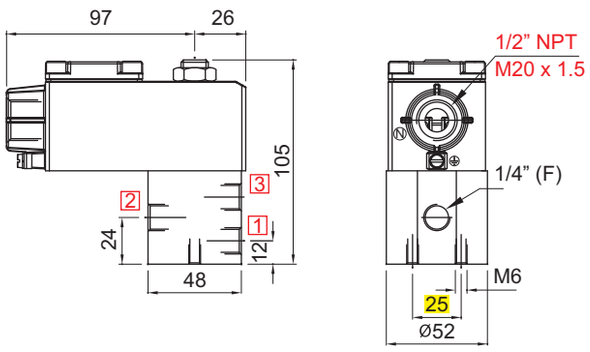
## CONSTRUCTION REFERENCE : 323

**VALVE TYPE : 30308**

**Valve Type : 30308 Body Stainless Steel and Large Enclosure**

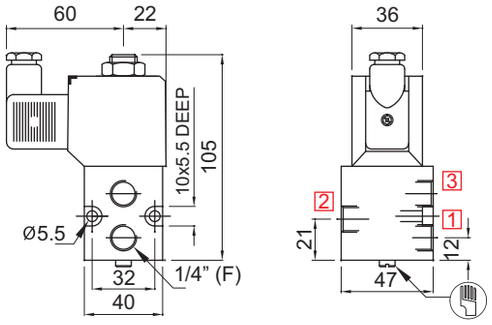



**TERMINAL BOX/ EX d/ LARGE ENCLOSURE, TYPE 16, 19, 37, 39, 58, 58LT, LC**

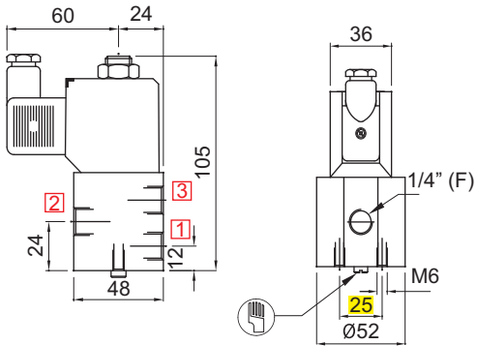



**TERMINAL BOX/ EX d/ LARGE ENCLOSURE, TYPE 16, 19, 37, 39, 58, 58LT, LC**

## CONSTRUCTION REFERENCE : 323

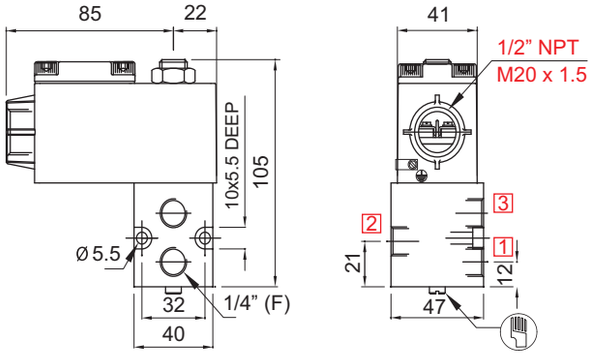



**PLUG IN SOLENOID TYPE 22/ 25**

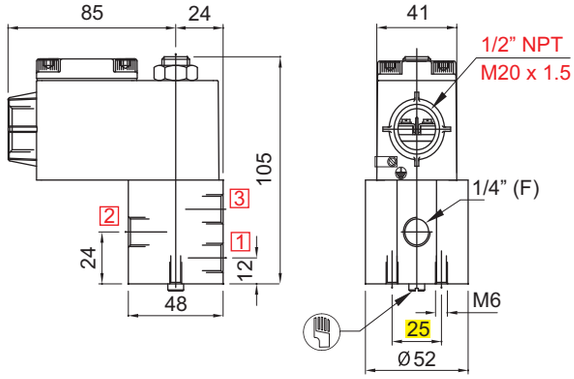



**PLUG IN SOLENOID TYPE 22/ 25**

## CONSTRUCTION REFERENCE : 323




**TERMINAL BOX/ Ex d/ TYPE 16, 19, 37, 39, 58, 58LT**




**TERMINAL BOX/ Ex d/ TYPE 16, 19, 37, 39, 58, 58LT**

7

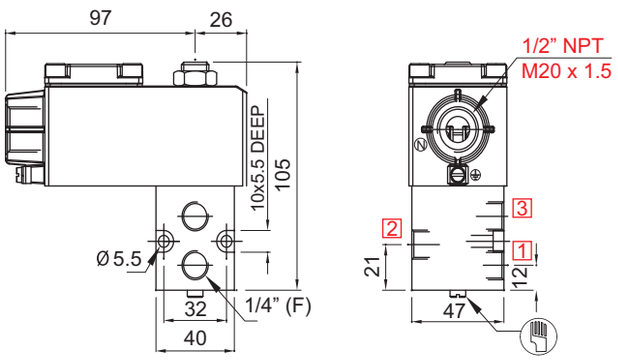
ROTEX
Engineering For The Future

# 3/2 DIRECT ACTING HIGH ORIFICE / UNIVERSAL SOLENOID VALVE

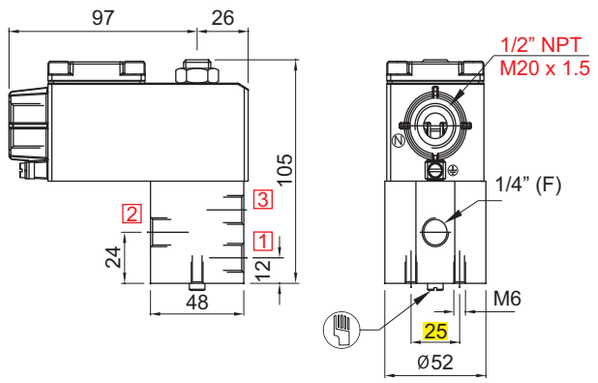
## DIMENSIONS

All Dimensions are in mm

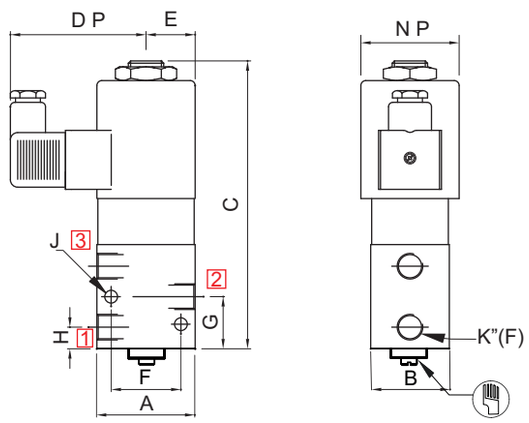
## CONSTRUCTION REFERENCE : 323



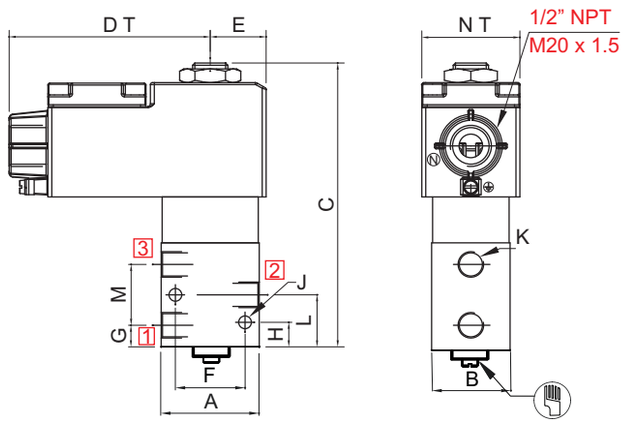

**TERMINAL BOX/ Ex d/ LARGE ENCLOSURE, TYPE 16, 19, 37, 39, 58, 58LT, LC**




**TERMINAL BOX/ Ex d/ LARGE ENCLOSURE, TYPE 16, 19, 37, 39, 58, 58LT, LC**



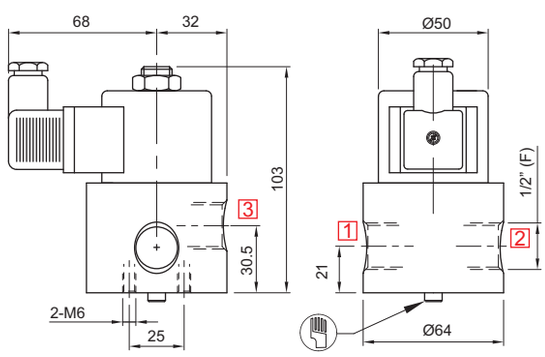

**PLUG IN SOLENOID TYPE 25**




**TERMINAL BOX/ Ex d/ TYPE 16, 17, 37, 39, 58, 58LT**

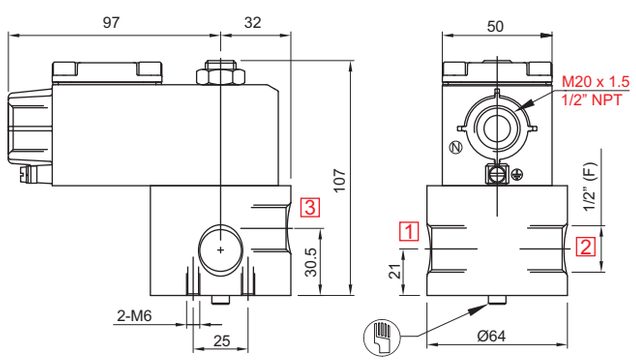
| NW | K (PORT SIZE) | A | B | C | D P | D T | E | F | G | H | J | L | M | N P | N T | CONST. REF. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VALVE TYPE : 30309, 30329 | | | | | | | | | | | | | | | | |
| 7 | 1/4",3/8" | 50 | 40 | 146 | 69 | 103 | 25 | 36 | 27 | 11 | 6.5 | 27 | 31 | Ø50 | M50 | 324 |
| 10 | 3/8",1/2" | 60 | 50 | 160 | 69 | 103 | 30 | 38 | 35 | 16 | 6.5 | 35 | 36 | Ø50 | M50 | 325 |

## CONSTRUCTION REFERENCE : 223




**PLUG IN SOLENOID TYPE 25/ 22**

## VALVE TYPE 30333




**TERMINAL BOX/ Ex d/ LARGE ENCLOSURE, TYPE 16, 19, 37, 39, 58, 58LT**

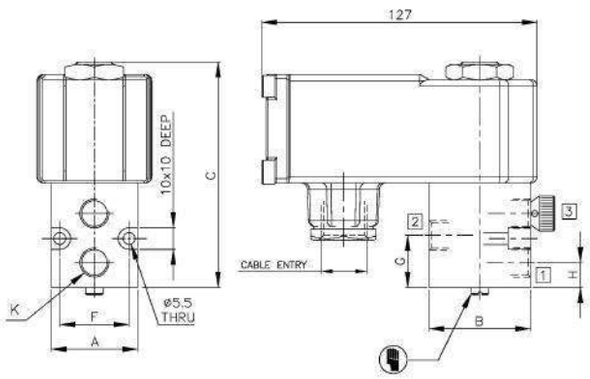
7



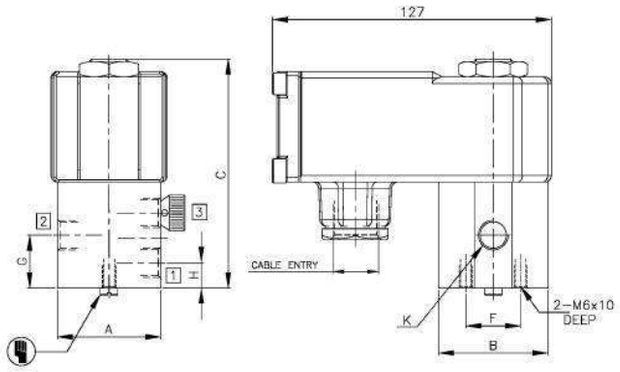
Specifications are subject to change without notice.

2

## 3/2 DIRECT ACTING, HIGH ORIFICE, UNIVERSAL SOLENOID VALVE



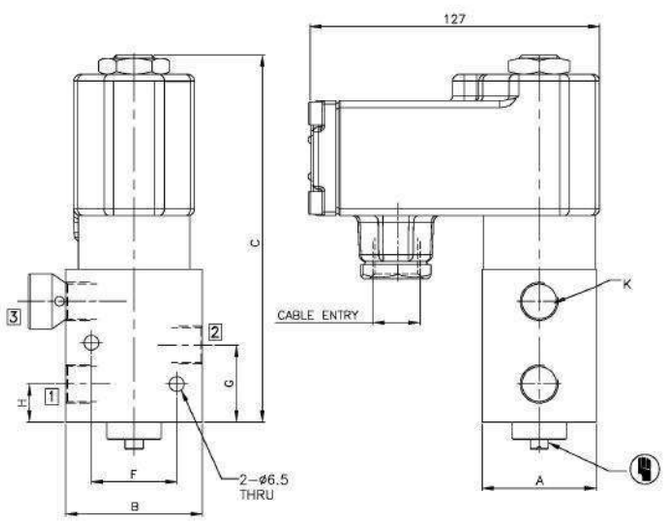

BCE SOLENOID/ Ex d TYPE 87



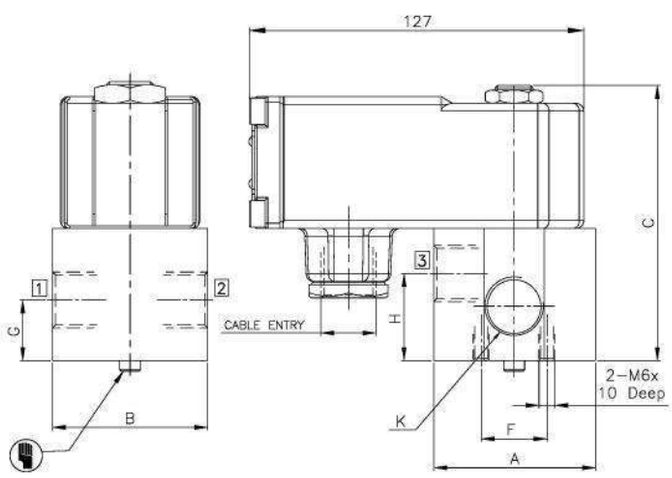

BCE SOLENOID/ Ex d TYPE 87

| K (PORT SIZE) | A | B | C | F | G | H | BODY MATL. | CONST. REF. |
|---|---|---|---|---|---|---|---|---|
| VALVE TYPE : 30308 | | | | | | | | |
| 1/4” | 40 | 47 | 104 | 32 | 24 | 12 | AL, BR | 323 |
| 1/4” | 47 | Ø50 | 104 | 25 | 24 | 12 | SS | 323 |
| | | | | | | | | |





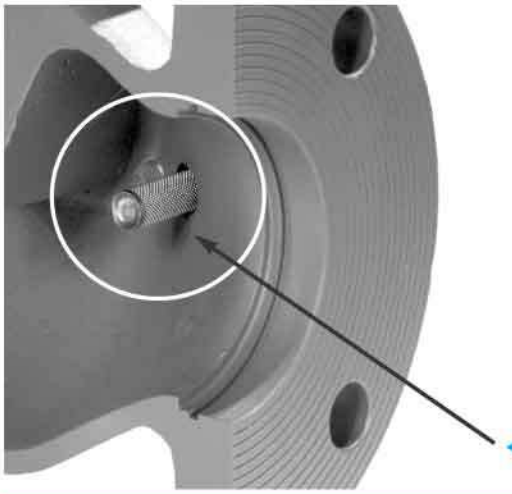

BCE SOLENOID/ Ex d TYPE 87




BCE SOLENOID/ Ex d TYPE 87

| NW | K (PORT SIZE) | A | B | C | F | G | H | CONST. REF. |
|---|---|---|---|---|---|---|---|---|
| VALVE TYPE : 30309, 30329 | | | | | | | | |
| 7 | 1/4”,3/8” | 40 | 50 | 146 | 36 | 27 | 11 | 324 |
| 10 | 3/8”,1/2” | 50 | 60 | 158 | 38 | 35 | 16 | 325 |

| K (PORT SIZE) | A | B | C | F | G | H | CONST. REF. |
|---|---|---|---|---|---|---|---|
| VALVE TYPE : 30333 | | | | | | | |
| 1/2” 3/8” | Ø62 | A/F59 | 104 | 25 | 22.5 | 32.5 | 223 |
| | | | | | | | |




## DESCRIPTION

The 123 Inline Strainer installs in the inlet side port of the main valve, and protects the pilot system from solid contaminates in the line fluid. The screen prevents the entrance of particles into the pilot system piping while flow through the main valve washes the screen clean. Recommended use on petroleum valve applications where flushing or removal of the screen for cleaning is not practical or may be considered hazardous.

## DIMENSIONS

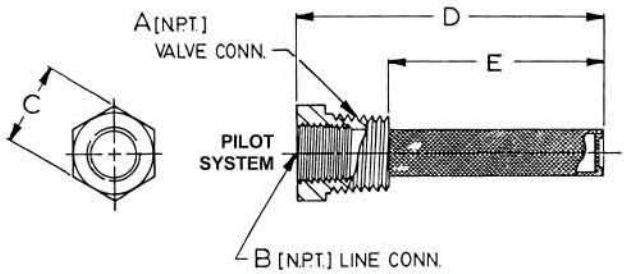
| PART NUMBER | A | B | C | D | E | USED ON VALVE SIZE |
|---|---|---|---|---|---|---|
| 660704 | 3/8 | 1/4 | 11/16 | 2 3/16 | 1 1/2 | 1 1/4"-6" |
| 660705 | 1/2 | 3/8 | 7/8 | 2 1/4 | 1 1/2 | 8"-10" |
| 660706 | 3/4 | 1/2 | 1 1/8 | 2 3/8 | 1 1/2 | 12"-16" |

## MATERIALS

Inline strainers are all-stainless steel construction.

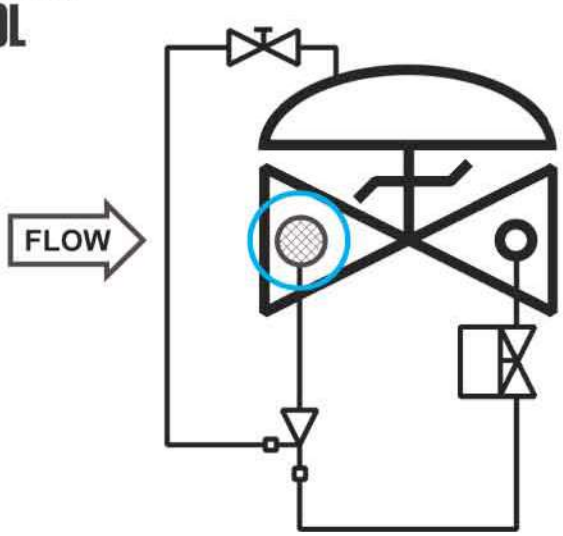
## SCREEN SIZE

Standard screen is 40 mesh. Other mesh sizes are available.




## SCHEMATIC SYMBOL

The Model 123 Inline Strainer is shown on OCV Valve Schematics as:




EXAMPLE: Shown here on a MODEL 115-2 Solenoid Valve.

**TOLL FREE 1.888.628.8258** • **phone:** (918)627.1942 • **fax:** (918)622.8916 • 7400 East 42nd Place, Tulsa, OK 74145
**email:** sales@controlvalves.com • **website:** www.controlvalves.com



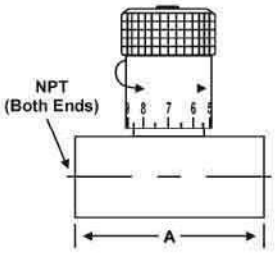
Inline Strainer 123

## DESCRIPTION

The Model 141-2 Needle Valve is an adjustable restriction device installed in the control circuit tubing. The setting of the needle valve meters the flow into and out of the main valve diaphragm chamber, thus controlling the response speed of the main valve. Depending on the application, the needle valve may be used as a closing speed control, opening speed control, or both simultaneously.

◀**Needle Valves shown**
**Sizes: 3/4" & 1/4"**

## MODEL 141-2 MATRIX

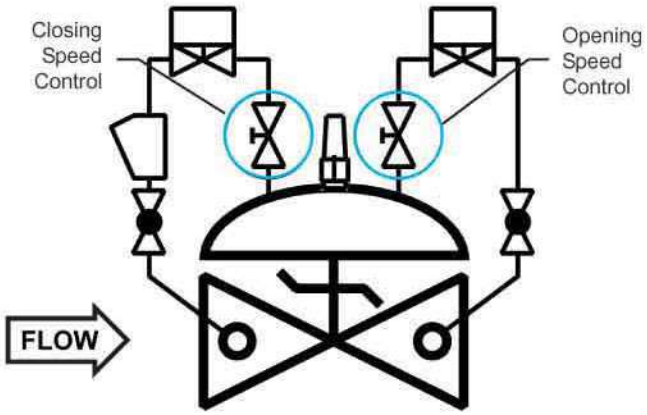



| MATERIAL | PART NUMBER | INLET/OUTLET (NPT) | A | USED ON VALVE SIZE* |
|---|---|---|---|---|
| Brass | 683100 | 1/4 | 2 | 1 ¼"-2" |
| Brass | 683101 | 3/8 | 2 1/4 | 2 ½"-6" |
| Brass | 683102 | 1/2 | 2 5/8 | 8"-10" |
| Brass | 683103 | 3/4 | 3 1/4 | 12"-16" |
| Stn. Steel | 683700 | 1/4 | 2 | 1 ¼"-2" |
| Stn. Steel | 683702 | 3/8 | 2 1/4 | 2 ½"-6" |
| Stn. Steel | 682704 | 1/2 | 2 5/8 | 8"-10" |
| Stn. Steel | 683703 | 3/4 | 3 5/8 | 12"-16" |

Note: Needle valve size may vary on valve application. Consult factory.

## SCHEMATIC SYMBOL

The Model 141-2 Needle Valve is shown on OCV Valve Schematics as:

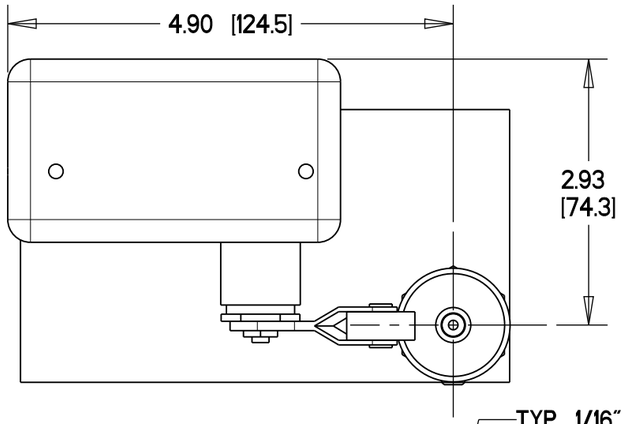



EXAMPLE: Shown here on a MODEL 115-3 DIGITAL VALVE as separate opening and closing speed controls.

**TOLL FREE 1.888.628.8258** • **phone:** (918)627.1942 • **fax:** (918)622.8916 • 7400 East 42nd Place, Tulsa, OK 74145
**email:** sales@controlvalves.com • **website:** www.controlvalves.com



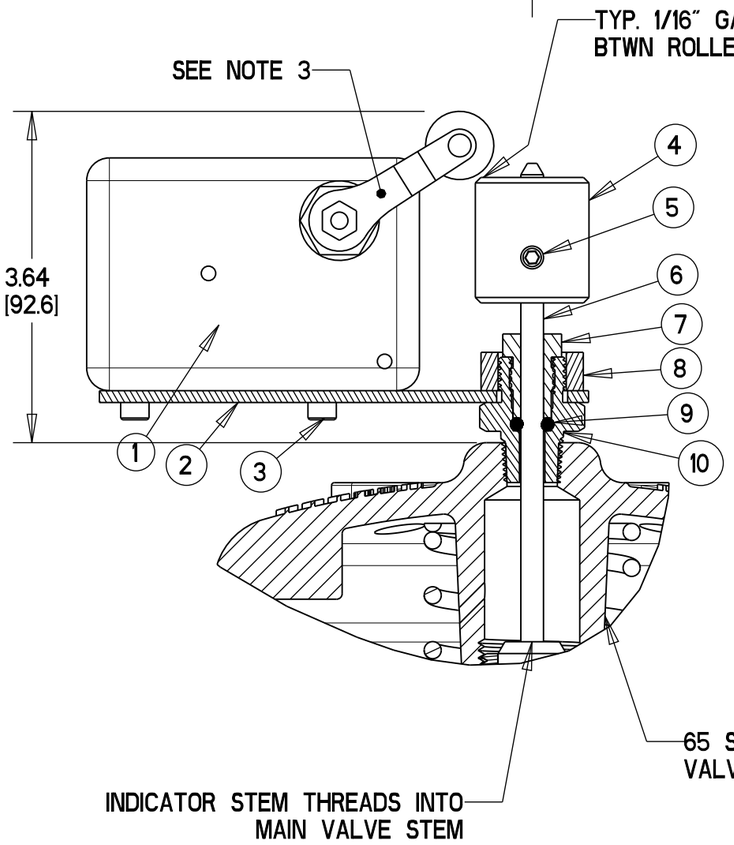
Needle Valve 141-2

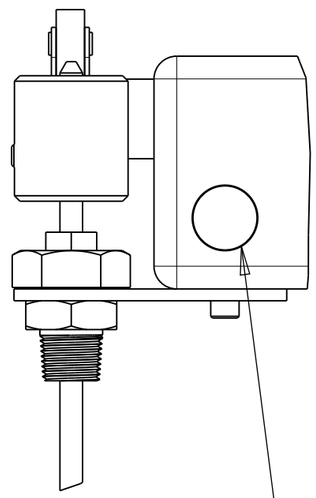



INDICATOR STEMS (Ø0.25")

| P/N | LENGTH (INCHES) | MATERIAL | MAIN VALVE SIZES |
|---|---|---|---|
| 316005 | 4.50 | MONEL | 1.25-1.5N |
| 316006 | 5.75 | | 2-4IN |
| 316008 | 7.88 | | 6-8IN |
| 316009 | 9.25 | | 10-12IN |
| 316010 | 10.75 | | 14-16IN |

| ITEM | PART NUMBER | QTY | PART DESCRIPTION | MATERIAL |
|---|---|---|---|---|
| 1 | SEE TABLE | 1 | LIMIT SWITCH | SEE TABLE |
| 2 | 316412 | 1 | MOUNTING PLATE | STN STEEL |
| 3 | 530702 | 2 | CAPSCREW, 10-32 X 3/8 | STN STEEL |
| 4 | 316021 | 1 | COLLAR | STN STEEL |
| 5 | 530708 | 1 | SET SCREW, COLLAR 1/4-20 X 1/2" | STN STEEL |
| 6 | SEE TABLE | 1 | INDICATOR STEM | SEE TABLE |
| 7 | 300155 | 1 | BUSHING | BRASS |
| 8 | 590747 | 1 | NUT, 3/4-16 | STN STEEL |
| 9 | 611108 | 1 | O-RING | VITON-F |
| 10 | 300753 | 1 | ADAPTOR | STN STEEL |




NOTES:
1. WEATHER-PROOF LIMITS:
   NEMA 4. RATED FOR 15 AMP 480 VAC/DC CONTACTS.
2. EXPLOSION-PROOF LIMITS:
   NEMA 1,7,9. RATED FOR 20 AMP
   UL LISTED, CSA CERTIFIED, ATEX APPROVED.
   NOT WEATHERPROOF RATED
3. LEVER TRAVEL IS SPRING DRIVEN CW FOR STANDARD CONFIGURATION (⌖).
   NON-STANDARD OPTIONS ARE AVAILABLE FOR CCW DIRECTION
4. LIMIT SWITCH HOUSINGS ARE DIE CAST ALUMINUM
5. INCHES [MM]. INCHES ARE STANDARD
6. TYPCIALLY USED IN PETROLEUM FLUID APPLICATONS.

⌖ STANDARD CONFIGURATION

## LIMIT SWITCHES

| PART NUMBER | DESCRIPTION | RATINGS | SWITCH TYPE | 65 CLOSED | 65 OPENED |
|---|---|---|---|---|---|
| ⌖ 589000 | OP-AR | WEATHERPROOF | SPDT | N.C CONTACT(S) CLOSED | N.C CONTACT(S) OPEN |
| ⌖ 589003 | EX-AR | EXPLOSIONPROOF | | N.O CONTACT(S) OPEN | N.O CONTACT(S) CLOSED |
| ⌖ 589002 | OPD-AR | WEATHERPROOF | DPDT | SWITCH ROLLER OFF COLLAR | SWITCH ROLLER ON COLLAR |
| ⌖ 589001 | EXD-AR-3 | EXPLOSIONPROOF | | | |
| | | | | | |
| 589143 | OP-AR30 | WEATHERPROOF | SPDT | N.C CONTACT(S) OPEN | N.C CONTACT(S) CLOSED |
| 589017 | EX-AR-30 | EXPLOSIONPROOF | | N.O CONTACT(S) CLOSED | N.O CONTACT(S) OPEN |
| 589009 | OPD-AR30 | WEATHERPROOF | DPDT | SWITCH ROLLER ON COLLAR | SWITCH ROLLER OFF COLLAR |
| 589177 | EXD-AR30-3 | EXPLOSIONPROOF | | | |

| CHG | ECN | DATE | BY |
|---|---|---|---|
| E | | | |
| D | | | |
| C | | | |
| B | | | |
| A | | | |

REVISIONS

REF DWG NO'S

MATERIAL: SEE TABLE

TOLERANCES: UNLESS NOTED
.XX ±.015
.XXX ±.005
ANGULAR ±0.5°
MACH FINISH 125

NO. REQ'D

SCALE 0.600

DRAWN BY JRK DATE 10-22-18

CHKD BY RON DATE 10-22-18

# OCV Control Valves

TULSA OKLAHOMA USA

## MODEL 150 HORIZONTAL LIMIT SWITCH (Ø1/4" STEM, WITH O-RING SEAL)

SIZE B

DRAWING NUMBER 150_LIM_SW_HORIZ

REV


**Global** performance. **Personal** touch.